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**THE FISHES OF DELAWARE.**

BY HENRY W. FOWLER.

The waters of the State of Delaware may well be included in the marine fauna known as the Virginian, which is not essentially different from that of New Jersey. The extent of sea-coast is comparatively short, about 23 miles, and from this little positive information has yet been obtained. Several years ago the deep-sea pound established off Dewey Beach was abandoned, so that no important fish industry is carried on at present. Many of the off-shore fishes are said to have been taken in the pound, and some of them quite frequently.

The surf fauna along the beaches, which are usually moderately inclined and easily seined in many places, furnishes schools of smaller fishes, such as *Mugil*, *Trachinotus* and *Menticirrhus*. Crustacea, such as *Ocypode albicans*, *Callinectes sapidus*, *Ovalipes ocellatus* and *Emerita talpoida*, are abundant and often constitute the food of many fishes.

The bays present peculiarities in their tides. The greatly larger area of Delaware Bay has a broad outlet to the sea with the usual tidal, allowing a great influx of marine forms, most of which ascend to Ship John Light or Bombay Hook Point. On the other hand, though both Indian River and Rehoboth Bays are salt water, they have little or no tides, as the only channel of egress to the sea is the Indian River Inlet, which being very narrow allows only a comparatively small escape and inflow of water. However, marine fishes enter these bays by this passage, and sometimes in numbers. *Uca* ranges along the salt and brackish marshes as far north as Armstrong's Creek in Newcastle County. Prawns, like *Palæmonetes vulgaris*, occur almost everywhere.

The fresh-water fauna may be divided into a tidal and an above-tidal region, of which the latter may again be divided into a lowland and an upland region. The first of these is largely homogeneous throughout the drainage of both the Delaware and Chesapeake Bays. *Acipenser sturio*, *Lepisosteus*, *Pomolobus pseudoharengus*, *Alosa*, *Osmerus*, *Ameiurus catus*, *Fundulus heteroclitus macrolepidotus*, *Tylosurus*, *Roccus* and *Morone* are characteristic. *Apeltes quadracus*, not yet taken in the State, may also occur, likewise *Dorosoma cepedianum*. *Palæmonetes vulgaris* is the most abundant crustacean.

The lowland region above tide has comparatively few forms characteristic. They are *Notropis chalybæus*, *Erimyzon*, *Ameiurus natalis prosthistiis*, *Esox*, *Umbra*, *Gambusia*, *Aphredoderus*, *Enneacanthus*, *Mesogonistius* and *Boleichthys*. Though *Acantharchus pomotis* has not yet been obtained in Delaware, it may occur in this region. An interesting condition is presented along the basin of Laurel Creek above Laurel, where there is still a cypress swamp of moderate extent. The water in these fresh lowland streams is mostly dark, though less deeply stained than the costal or pine-woods streams in New Jersey. The fishes are also less darkly colored, though locally some are quite smutty. But little sphagnum has been noted, and I have not seen any submerged beds. *Palæmonetes vulgaris* is everywhere the most abundant crustacean. *Rana clamata*, *R. pipiens* and *R. palustris* are abundant amphibians, and *Natrix*, *Kinosternon*, *Sternotherus* and *Chrysemys* the most common reptiles I met with along the streams.

The upland region, comprised mainly in the bed of Christiana Creek, in the upper part of New Castle County, and therefore of comparatively small area, agrees largely with the rest of its extent in the adjoining portions of Chester and Delaware Counties in Pennsylvania. Many of these streams are quite rocky. *Hybognathus*, *Pimephales*, *Semotilus*, *Abramis*, *Notropis*, *Rhinichthys*, *Catostomus commersonnii*, *Erimyzon*, *Ameiurus nebulosus*, *Schilbeodes*, *Esox*, *Fundulus diaphanus*, *Lepomis*, *Eupomotis*, *Boleosoma* and *Perca* are characteristic. I have not found *Rhinichthys cataractæ*, *Exoglossum maxillingua*, *Catostomus nigricans* or *Cottus gracilis* within the limits of the State, though they all occur in the Brandywine basin just over the Pennsylvania line.

Certain catodromous fishes, like the eels, and the anadromous lampreys and clupeoids may be met with in many fresh waters, though their true homes are in the sea. Fresh-water forms of wide distribution, like *Abramis*, *Esox*, *Umbra*, *Eupomotis* and *Perca*, are interesting, as they often range down close to the sea.

The present account is offered, although very little has yet been published on this interesting fish-fauna, and though necessarily preliminary, in the hope that it will be of use in the study of geographical distribution. The few scattered records or notes relating to the fishes of this State which have been published are included as foot-notes. For these reasons I have visited a number of localities, at the same time making collections and studies. All such materials obtained have been placed in the collections of The Academy of Natural Sciences of Philadelphia. I am especially indebted to Mr. A. D. Poole, President of the Delaware Game Protective Association, for the grant of a

permit to collect fishes in Delaware and for enabling me to secure some valuable collections from Wilmington. I am also under obligations in many ways, either for notes or contributions of specimens, to Dr. R. J. Phillips, Mr. S. N. Rhoads, Mr. T. D. Keim, Mr. C. J. Pennock, Dr. Herman Burgin, Mr. H. L. Mather, Jr., Mr. B. W. Griffiths, and others. A number of the more common market fishes have also been examined, though none of these were preserved.

**Myxine glutinosa** Linnæus.

Only known from off-shore by Smith and Kendall's record.<sup>1</sup>

**Petromyzon marinus** Linnæus. "Lamprey."

I found a small one in the White Clay Creek near Thompson, April 9, 1910, which was not preserved. Mostly taken in the spring, in tidal waters and ascending streams with direct communication to the sea. Mr. Poole says they formerly ascended Mill Creek near Wilmington.

**Eulamia milberti** (Müller and Henle). "Shark."

One small example taken at Dewey Beach, Sussex County, October 12, 1910.

**Sphyrna zygaena** (Linnæus). "Hammer-head Shark."

Although I have no examples, it undoubtedly occurs about Rehoboth, where Mr. Charles Jaeger says he saw a number of small examples, the largest not over 3 feet in length, in September several years ago.

**Squatina squatina** (Linnæus). "Lizard Fish."

Greatly detested by the fishermen, who say it has been common at times off Dewey Beach, many having been taken in the pound. Several years ago they were also said to have been very abundant southward, as at Ocean City and Chincoteague, sometimes greatly annoying the sturgeon fishermen by being gilled in their nets. A stuffed example in the Academy was evidently secured at Lewes some years ago.<sup>2</sup>

**Manta birostris** (Walbaum).

Twice described<sup>3</sup> from the entrance to Delaware Bay. No examples from Delaware in the Academy.

I have a number of egg-cases, empty, collected recently on Dewey and Rehoboth Beaches, which probably belong to *Raja ocellata* and *R. eglanteria*, both of which are said to be abundant in the region.

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<sup>1</sup> *Rep. U. S. F. Com.*, 1896 (1898), p. 169.

<sup>2</sup> *Squatina dumerili* in *Proc. Acad. Nat. Sci. Phila.*, 1875, p. 510, from A. Purvis, in list of donations to the Museum.

<sup>3</sup> *Cephalopterus vampyrus* Mitchill, *Ann. Lyc. Nat. Hist. N. Y.*, I, 1824, p. 23, Pl. 2, fig. 1. *Cephaloptera giorna* Le Sueur, *Journ. Acad. Nat. Sci. Phila.*, IV, 1824, p. 115, Pl. 16, figs. 1-4.

**Acipenser sturio** Linnæus. "Sturgeon."

Reported from Delaware City by Ryder,<sup>4</sup> where it was formerly abundant and the object of extensive fisheries, though now said to be scarce. The occasional large sturgeon still to be seen in Philadelphia markets is usually now captured further down the coast. I recently picked up a large dorsal scute on Dewey Beach.

**Acipenser brevirostrum** Le Sueur.

Included on Ryder's authority.<sup>4</sup> He notes<sup>5</sup> from Delaware City.

**Lepisosteus osseus** (Linnæus). "Gar Pike."

Described many years ago from a stuffed example still in the Academy, probably from Bombay Hook.<sup>5</sup> Mr. Rhoads secured heads at Seaford and in the Indian River about 3 miles below Millsboro.

**Pomolobus pseudoharengus** (Wilson). "Branch Herring."

Ascends fresh-water streams and such waters above tide as have direct communication with the sea. Though no examples in the Academy from Delaware, I have examined examples at Wilmington. In many places very abundant in the spring runs, great numbers being captured in the Indian River to Millsboro, Laurel Creek to Laurel, Mispillion Creek to Milford, Delaware City and the canal at St. Georges. *P. mediocris* appears at the fisheries earlier and *P. æstivalis* comes much later, and though I have not obtained either, both doubtless occur in most tidal waters.

**Alosa sapidissima** (Wilson). "Shad."

This far-famed food-fish is taken in numbers in most of the larger tidal waters during the spring run,<sup>6</sup> though not running into the smaller fresh waters so far as the branch herring. I have seen market examples at Wilmington. Young in the Academy from Fort Delaware.

**Brevoortia tyrannus** (Latrobe). "Menhaden."

Common along the coast<sup>7</sup> and in Delaware Bay. Sometimes ascends the Delaware nearly to Philadelphia. Young in the Academy from Fort Delaware.

**Anchovia mitchilli** (Valenciennes).

Many from Fort Delaware, obtained by Dr. C. Arrott, are in the collection.

<sup>4</sup> *Bull. U. S. F. Com.*, VIII, 1888 (1890), p. 240.

<sup>5</sup> *Lepisosteus crassus* Cope, *Proc. Acad. Nat. Sci. Phila.*, 1865, p. 86.

<sup>6</sup> *Forest and Stream*, VI, February 10, 1876, p. 6. A few in January and February at Bombay Hook.

<sup>7</sup> *L. c.*, V, November 11, 1875, p. 230. Great numbers chased ashore by bluefish.

**Salmo salar** Linnæus. "Salmon."

Introduced in the Delaware River, and Harmsworth mentions subsequently that they had been taken one season in most shad fisheries from Fort Delaware to the Water Gap.<sup>8</sup> I have no recent information and never saw an example.

**Salvelinus fontinalis** (Mitchill). "Brook Trout."

Several streams in Kent County were reported, some years ago, as having been stocked with brook trout.<sup>9</sup> Though apparently rare or entirely absent in suitable localities at present, it is likely to have been indigenous perhaps in some streams in the northern portions of Newcastle County in early times. No examples.

**Osmerus mordax** (Mitchill). "Smelt."

Recorded many years ago from the Brandywine Creek at Wilmington.<sup>10</sup> No examples.

**Anguilla chrisypa** Rafinesque. "Eel."

Abundant in almost all waters. Many have been taken about Lewes, and in Indian River Bay quite an eel-pot industry is carried on, though the eels taken in these pots are all rather small or of moderate size. My examples from Mispillion Creek, Milford, Brown's Branch near Harrington, Armstrong's Creek, Newcastle and Wilmington.

**Leptocephalus conger** (Linnæus).

No examples. Reported about the breakwater at Lewes, where Mr. F. J. Keeley secured one of 15½ pounds.

**Hybognathus nuchalis regius** (Girard).

A few from the Brandywine Creek near Wilmington.

**Pimephales notatus** (Rafinesque).

No examples. Said<sup>11</sup> to range from the "St. Lawrence River to Delaware."

**Semotilus bullaris** (Rafinesque). "Fall Fish."

Abundant in the Christiana Creek basin. Dr. Phillips has found it in Burrow's Run, the Red Clay Creek throughout its course, Mill Creek near Hockessin, and the White Clay Creek near its mouth. My examples from near Holly Oak in a small run, and the Brandywine basin near Wilmington.

**Semotilus atromaculatus** (Mitchill).

Abundant in the Christiana upland basin. Dr. Phillips has found

<sup>8</sup> *Forest and Stream*, XLIV, June 8, 1895, p. 464.

<sup>9</sup> *L. c.*, XXIX, December 1, 1887, p. 369.

<sup>10</sup> *Osmerus viridescens* Norris, *Am. Angler's Book*, 1864, p. 263. *Forest and Stream*, XI, December 5, 1878, p. 361.

<sup>11</sup> Blatchley, *Proc. Acad. Nat. Sci. Phila.*, 1885, p. 64.

it in Mill Creek near Hockessin and Burrow's Run, in Newcastle County. I have examined examples from near Wilmington.

**Abramis crysoleucas** (Mitchill). "Roach. Bitter Head."

Found in almost all sluggish or still waters. Dr. Phillips secured it in the Red Clay Creek near the State line. I have examined very many examples from Naaman's Creek, Wilmington, Newcastle, Armstrong's Creek, White Clay Creek near Newark, Mispillion Creek near Milford, and Laurel Creek at Laurel.

**Notropis bifrenatus** (Cope).

I have found a few in the Brandywine Creek near Wilmington.

**Notropis proce** (Cope).

Found abundant in Laurel Creek tidal near Laurel and the Choptank headwaters near Marydel.

**Notropis hudsonius amarus** (Girard).

Very abundant in the Brandywine at Wilmington, near where I have secured many examples.

**Notropis whipplii analostanus** (Girard).

The most abundant cyprinoid in the Christiana basin. Very many examples from Wilmington, the White Clay Creek near Newark and Naaman's Creek.

**Notropis cornutus** (Mitchill). "Red Fin."

Many examples examined from Naaman's Creek, Shellpot Run, Wilmington, White Clay Creek at Newark, Laurel Creek tidal near Laurel, and the Choptank headwaters near Marydel.

**Notropis chalybæus** (Cope).

Abundant in lowland streams, especially in rather sluggish water. Many examples from Millsboro, Milford, Laurel and Marydel.

**Notropis photogenis amœnus** (Abbott).

A few small examples from the Choptank headwaters near Marydel.

**Rhinichthys atronasus** (Mitchill). "Black-nosed Dace."

Abundant in all upland brooks and streams. I found it in the Brandywine at Wilmington, Naaman's Creek, run near Holly Oak, Silversides, Shellpot Run and the White Clay Creek near Newark.

**Cyprinus carpio** Linnæus. "Carp."

Introduced in many waters. I have examined numbers of examples, finding several of the well-known varieties, not only market specimens, but many taken near Wilmington, and others at Millsboro. At the latter place some of the examples were at least 2 feet long.

**Catostomus commersonnii** (Lacépède). "Sucker."

Very abundant in the Christiana basin, and valued as a food-fish chiefly in cold weather. Dr. Phillips found it in the Red Clay Creek below Ashland and in Burrow's Run. Very many examples, of all ages, examined, from Silversides, Naaman's Creek, Shellpot Run and Wilmington.

**Erimyzon sucetta oblongus** (Mitchill). "Mullet."

Common in almost all streams, and the young often associated with young roach and *Notropis chalybeus*, characteristic of quiet lowland waters. Many examples of all ages examined from Wilmington, Millsboro, Milford, Laurel and Marydel. Though rather dark in color, like other small fish from dark lowland waters, none showed such intense melanism of similar fishes found in the deeply stained cedar streams of the New Jersey lowlands.

**Ameiurus catus** (Linnaeus). "White Catfish."

A valued food-fish, and in some places reaching a good size. Said to be common at Delaware City, Slaughter Beach, Lewes and Indian River Bay. Cope found it in Mispillion Creek. Dr. Burgin has secured it at Ship John Light, off the jetty at St. Georges and at Delaware City. My examples from Wilmington and Laurel.

**Ameiurus natalis prosthistius** (Cope). "Catfish. Black Catfish."

I have 3 large examples secured in the Indian River at Millsboro on October 14, 1910. This is quite interesting as being the first instance of the species being known from the peninsula. It appears to be frequent in this region, as a number of others were also secured by the fishermen.

**Ameiurus nebulosus** (Le Sueur). "Catfish. Yellow Catfish."

Abundant in almost all waters, especially in the Brandywine and Christiana Creeks. I have examined examples from Naaman's Creek, Wilmington and Armstrong's Creek. This species was described once from Mispillion Creek.<sup>12</sup>

**Schilbeodes gyrinus** (Mitchill).

One labeled "Delaware" was obtained many years ago from Dr. Pickering.

**Esox americanus** (Gmelin). "Pike."

Valued as a food-fish, though less so than the next, as it does not reach so large a size. Many examples examined from Naaman's Creek, near Chippewa, Armstrong's Creek, Wilmington, Delaware

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<sup>12</sup> *Ameiurus mispilliensis* Cope, *Proc. Am. Philos. Soc., Phila.*, XI, 1870, p. 486.



City, Brown's Branch near Harrington, and the Choptank headwaters near Marydel.

**Esox reticulatus** Le Sueur. "Pickerel."

One of the most valued food-fishes, though its game qualities are generally best exhibited after it has been hauled into the boat. Dr. Phillips found it in fresh water near Rehoboth, and it is also said to have been abundant in the canal at St. Georges. Many examples from Millsboro, Milford, Brown's Branch near Harrington, Laurel and Marydel, were examined.

**Umbra pygmæa** (De Kay). "Mud Minnow."

A seclusive little fish, often found buried in the muddy bottoms of little pools, or in quiet weedy or choked-up coves, always in fresh water. Dr. Phillips found it in fresh water near Rehoboth and Dr. Burgin has taken it in Bellevue Creek and near Bombay Hook. My numerous examples from Newcastle, Delaware City, Rehoboth, Brown's Branch near Harrington, and Laurel.

**Fundulus heteroclitus macrolepidotus** (Walbaum).

Abundant in almost all tidal waters as well as the costal salt ponds and ditches, where in many places they swarm by the thousand. My examples from Naaman's Creek, Holly Oak, Claymont, State Road, Armstrong's Creek, Red Lion Creek, Delaware City and Rehoboth. Doubtless *F. majalis* is abundant, as reported, about Lewes and Rehoboth in salt water, though I have no examples.

**Fundulus diaphanus** (Le Sueur).

I have not found this species out of fresh water, though it ranges down close to the ocean. Abundant in Naaman's Creek, Wilmington, Delaware City, Rehoboth and Laurel, where I have obtained many examples.

**Cyprinodon variegatus** Lacépède.

Abundant about Lewes and Rehoboth. It enters fresh water near the sea, though usually not beyond the reach of tide. My examples collected by Dr. Phillips at Rehoboth.

**Gambusia gracilis** (Heckel).

This little fish has been credited with ranging as far north as Delaware, on the Atlantic coast of the United States, for some years past.<sup>13</sup> I have been unable, however, to locate the original source of this information, as well as the exact locality in the State where the fish was obtained or observed. I have recently shown<sup>14</sup> that it also ranges

<sup>13</sup> *Gambusia affinis* Jordan and Evermann, *Bull. U. S. Nat. Mus.*, No. 47, I, 1896, p. 680.

<sup>14</sup> *Science*, XXVI, November 8, 1907, p. 639.

into the opposed regions of New Jersey along the southern part of Delaware Bay, where it was found to be very abundant in several streams. It is likewise very abundant in the fresh reaches of the Indian River about Millsboro, where it was first discovered by Mr. T. D. Keim and myself October 13, 1910. We secured many specimens, and found it distributed well above the dams almost everywhere. We also found but a single example in Mispillion Creek above the first dam at Milford, on October 15, 1910, which is evidently the most northern part of the State where it has yet been noted. As yet it has only been found by us in fresh water.

**Tylosurus marinus** (Walbaum). "Bill Fish."

Ascends almost all waters in their tidal regions. Dr. Burgin found it near St. Georges, the creek at St. Augustine, Mahon Beach and Little Creek Hundred. Mr. Poole has found it in Rehoboth Bay. It has been reported at Lewes and Delaware City. I have no examples, and only examined a few in the markets.

**Kirtlandia vagrans** (Goode and Bean).

Reported from Cape Henlopen by Smith and Kendall,<sup>15</sup> who thought this the most northern locality for the species at that time, though Bean had recorded it as early as 1888 from Great Egg Harbor Bay in New Jersey.

**Menidia menidia notata** (Mitchill).

Abundant along the coast, and reported at Lewes, Rehoboth and Indian River Bays. Though I have no preserved examples, I saw a small school at Dewey Beach during the past fall.

**Mugil cephalus** Linnaeus. "Fat-back. Jumping Mullet."

Abundant along the coast in the fall. A good food-fish and many taken in nets for market. I saw over 600, taken in a single sweep of the seine at Dewey Beach, on October 12, 1910.

**Mugil curema** Valenciennes. "Fat-back."

Very abundant at Dewey and Rehoboth Beaches, and though we seined a great number on October 12, 1910, they were exclusively this species, and all were quite small.

**Gasterosteus aculeatus** Linnaeus.

Included on Bean's Wilmington record.<sup>16</sup>

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<sup>15</sup> *Kirtlandia laciniata* Smith and Kendall, *Rep. U. S. F. Com.*, XXIII, 1896 (1898), p. 170.

<sup>16</sup> *Proc. U. S. Nat. Mus.*, III, 1880, p. 77.

**Syngnathus fuscus** Storer.

Mr. Pennock secured an example, also of the following species, from below Millsboro in 1905. Both species were known at Lewes.

**Hippocampus hudsonius** De Kay.

**Scomber scombrus** Linnæus. "Mackerel."

No examples. A few reported off Lewes every season by the fishermen.<sup>17</sup>

**achinotus carolinus** (Linnæus). "Pompano."

Found very abundant in the surf at Rehoboth and Dewey Beaches, of rather small size, and associated sometimes with *Mugil curema*, during the past October.

**Pomatomus saltatrix** (Linnæus). "Blue Fish. Snapping Mackerel."

Abundant at Dewey and Rehoboth Beaches, Lewes and along the shores of Delaware Bay, appearing irregularly in warm weather. Fishermen report them as high up the Delaware as Delaware City and Newcastle, but these said to be young. I have a small one from Dewey Beach.

**Poronotus triacanthus** (Peck). "Butter Fish."

I found an example about 10 inches long at Dewey Beach during the past October. Said to be common at Lewes and in Rehoboth Bay.

**Aphredoderus sayanus** (Gilliams).

Found abundantly in dark secluded waters, usually in quiet choked-up streams, pools or weedy places. All my examples from fresh-water above tide, in the Indian River at Millsboro, Brown's Branch near Harrington and the Choptank headwaters near Marydel.

**Enneacanthus gloriosus** (Holbrook).

Very abundant in similar waters in which the preceding species occurs. Many examples from Millsboro, Milford, Laurel, Marydel and Delaware City.

**Mesogonistius chætodon** (Baird).

This small fish, perhaps the most strikingly handsome of all our fresh-water species, prefers still, quiet, weedy waters, especially in such localities as are productive of *Ceratophyllum* and other luxuriant aquatic plants. Very abundant in many localities. My specimens from Millsboro, Milford and Laurel.

**Lepomis auritus** (Linnæus). "Long-eared Sunfish. Red-belly."

Abundant in the upper reaches of fresh waters, especially the more

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<sup>17</sup> *Forest and Stream*, IV, May 13, 1875, p. 217. About 50 miles east of the breakwater.

upland streams, such as the Christiana basin. It does not apparently descend so far below and into the tidals as the next species. Many examples examined from the Brandywine basin at Wilmington and the White Clay Creek at Newark. Dr. Burgin says it was abundant several years ago in the canal at St. Georges.

**Eupomotis gibbosus** (Linnæus). "Sunfish. Yellow-belly."

Common in most all fresh waters and approaching near to the lower tidals, though I have not seen any from salt or brackish water. Many examples examined from Naaman's Creek, Holly Oak, Shellpot Run, Wilmington, Armstrong's Creek, Delaware City, Millsboro and 3 miles below in the Indian River, Milford, Laurel and Marydel.

**Micropterus dolomieu** Lacépède. "Small-mouth Bass."

Introduced in fresh water on account of its excellent game and food qualities. My specimens from Wilmington.

**Micropterus salmoides** (Lacépède). "Large-mouth Bass."

Introduced like the preceding, and though attaining a larger size and valued as food, it is usually less esteemed by anglers. I have examined a number of large examples at Millsboro.

**Perca flavescens** (Mitchill). "Ring Perch."

Usually abundant in fresh tidal regions. Dr. Phillips found it common in the canal at St. Georges, and I found it in Naaman's Creek, Armstrong's Creek and Laurel Creek at Laurel, though almost all these examples were small or of moderate size.

**Boleosoma nigrum olmstedii** (Storer).

Usually found in clear shallow water, preferably on sandy or gravelly bottoms, though often among weeds. Very abundant in the Christiana basin. I have examined many examples, those obtained by Cope in "Sussex County" and Dr. Arrott at Fort Delaware, besides those I secured myself in Naaman's Creek, the Brandywine basin at Wilmington, the White Clay Creek near Newark, and the Choptank headwaters near Marydel. All my examples were obtained above tide.

**Boleichthys fusiformis** (Girard).

Abundant in almost all lowland fresh waters, at least above tide. It is rather seclusive, and to be found usually associated with *Erimyzon*, *Aphredoderus*, *Enneacanthus*, *Mesogonistius* and similar fishes. Many examples, besides those Cope obtained in Sussex County, examined, from the Mispillion Creek at Milford and Laurel Creek at Laurel.

**Roccus lineatus** (Bloch). "Striped Bass."

Large examples are sometimes captured during the spring in shad-

nets along the Delaware. I saw an example of about 17 pounds weight at Lewes in 1907. Dr. Phillips says it is reported from the Indian River at Cedar Grove Park and the upper end of Rehoboth Bay.

**Morone americana** (Gmelin). "Black Perch."

Common in most fresh or brackish tidals and also in salt water. Dr. Phillips found it in a fresh pond near Rehoboth. Dr. Burgin notes it off the jetty at St. Georges in 1895. I have examined examples at Lewes and Millsboro, the latter of quite dark or dusky coloration, apparently well gaining the appropriate local vernacular.

**Centropristis striatus** (Linnæus). "Sea Bass."

A valued and abundant food-fish along the coast,<sup>18</sup> entering Delaware Bay. I have only examined market examples of this species, and also a few of the next.

**Stenotomus chrysops** (Linnæus). "Porgy."

Abundant along the coast<sup>19</sup> and enters Delaware Bay.

**Archosargus probatocephalus** (Walbaum).

Apparently scarce, though a valued food-fish.<sup>20</sup> Dr. Burgin reports a few at Ship John Light in 1885. No examples.

**Cynoscion regalis** (Schneider). "Yellow-finned Trout."

An abundant food-fish along the coast and in Delaware Bay, above which it is said to ascend sometimes to Delaware City and the mouth of Christiana Creek. Dr. Burgin reports a few at Ship John in 1885. Abundant in Indian River and Rehoboth Bays and at Lewes, though most of the larger ones from off shore. I have seen a number of market examples.

**Cynoscion nebulosus** (Cuvier). "Spotted Trout."

Distributed like the last, though usually less abundant and apparently not wandering so far from the sea.<sup>21</sup> Said to reach a large size off shore, about Lewes, and in Rehoboth and Indian River Bays. I have only seen a few market examples.

**Micropogon undulatus** (Linnæus). "Croesus."

An abundant costal food-fish, entering Delaware Bay, and also said to be common at Lewes and in Rehoboth Bay. I have seen some adult market examples.

<sup>18</sup> *Forest and Stream*, XVII, August 11, 1881, p. 31. Off Indian River. *L. c.* XXXIV, April 17, 1890, p. 250. Off Cape Henlopen.

<sup>19</sup> *L. c.*, LIX, July 12, 1902, p. 29. Banks 10 to 12 miles east of the breakwater.  
<sup>20</sup> *L. c.*, X, February 7, 1878, p. 6. Breakwater. *L. c.*, XX, June 28, 1883, p. 429. Breakwater. *L. c.*, XXII, June 5, 1884, p. 367. Breakwater.

<sup>21</sup> *L. c.*, LIX, July 12, 1902, p. 29. Banks 10 to 12 miles east of the breakwater.

***Menticirrhus saxatilis*** (Schneider).

An abundant food-fish along the coast and entering Delaware Bay. I secured it at Rehoboth Beach in October.

***Menticirrhus littoralis*** (Holbrook).

Three small examples were seined in the surf at Rehoboth Beach on October 12, 1910. This is the most northern locality at which the species has been taken on the Atlantic coast of the United States.

***Tautoga onitis*** (Linnaeus). "Black Fish."

No examples. Reported about the breakwater at Lewes,<sup>22</sup> according to Dr. Phillips.

***Balistes carolinensis*** Gmelin.

One angled at the Lewes breakwater about 1890 by Mr. F. J. Keeley. It was not preserved.

***Prionotus carolinus*** (Linnaeus). "Sea Robin."

Young from Rehoboth and Dewey Beaches.

***Paralichthys dentatus*** (Linnaeus). "Flounder."

Abundant along the coast and in Delaware Bay in warm weather. I have examined market examples.

***Pseudopleuronectes americanus*** (Walbaum). "Winter Flounder."

Distributed like the last, and remains all the year. Many angled in cold weather in Indian River, Rehoboth and Delaware Bays. I have seen a few market specimens.

***Achirus fasciatus*** Lacépède. "Hog Choke."

Found in most tidal and salt waters. Said to be abundant in Rehoboth and Indian River Bays, and about Lewes. Also small ones occasional at Delaware City. Mr. Rhoads secured, in 1903, an example now in the Academy, three miles below Millsboro.

***Zoarces anguillaris*** (Peck).

Said to range from "Delaware to Labrador."<sup>23</sup> No examples.

***Ammodytes americanus*** De Kay. "Sand Eel."

Found abundant on Rehoboth and Dewey Beaches during last October. Also reported previously as common at Lewes. Many examples in the collection.

***Gadus callarias*** (Linnaeus). "Codfish."

Reported common in cold weather off the coast. I have examined market examples. Mr. H. Walker Hand says the first cod known to

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<sup>22</sup> *Forest and Stream*, XXII, June 5, 1884, p. 367, breakwater.

<sup>23</sup> Jordan and Evermann, *Bull. U. S. Nat. Mus.*, No. 47, III, 1898, p. 2457.

him from Delaware Bay was captured last spring between Dead Man Shoal and Fourteen Foot Bank.

**Urophycis regius** (Walbaum).

Dr. Phillips caught 3 on May 18, 1908, at Rehoboth, where they were locally called "tomcod." These specimens were not preserved.

**Merluccius bilinearis** (Mitchill). "Whiting."

Found off the coast in cold weather. I have examined a number of market examples. Said to be an abundant fish at times and valued as food.

**Lophius piscatorius** Linnæus. "Goose Fish."

Abundant in Delaware Bay, according to the fishermen who know it at Lewes and Rehoboth. I have examined a Delaware Bay example now in the Academy.

Besides the foregoing, many other marine species are taken, and some very abundantly. Quite a number have been reported to me by various anglers, fishermen or amateur naturalists, and as all have either been found in New Jersey or the coast of Worcester County, Maryland, it is almost inevitable that they will be added to the fauna of the State. Such species are: *Carcharias littoralis*, *Galeocерdo tigrinus*, *Mustelus mustelus*, *Alopias vulpes*, *Eulamia obscura*, *Squalus acanthias*, *Pristis pectinatus*, *Raja erinacea*, *R. lævis*, *Dasyatis centroura*, *D. say*, *Myliobatis freminvillii*, *Rhinoptera bonasus*, *Opisthonema oglinum*, *Synodus jætens*, *Felichthys marinus*, *Seriola zonata*, *Caranx hippos*, *Selene vomer*, *Seserinus paru*, *Epinephelus morio*, *Orthopristis chrys-  
opterus*, *Lagodon rhomboides*, *Bairdiella chrysura*, *Sciænops ocellatus*, *Leiostomus xanthurus*, *Pogonias cromis*, *Alutera schæpfi*, *Chætodipterus faber*, *Chilomycterus schæpfii*, *Diodon hystrix*, *Lagocephalus lævigatus*, *Spheroides maculatus*, *Mola mola*, *Echeneis naucrates*, *Rissola marginata*, *Hippoglossus hippoglossus* and *Melanogrammus æglifinis*.